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South Dakota State University, Cooperative Extension, "Cool-Season Grasses for Early Spring and Fall" (1975). *SDSU Extension Fact Sheets*. 583.

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cool-season grasses for early spring and fall



Crested wheatgrass • Siberian wheatgrass
• Russian wildrye • Canada wildrye
• Kentucky bluegrass • Canada bluegrass
• Junegrass

Cooperative Extension Service
South Dakota State University
U. S. Department of Agriculture

Cool-Season Grasses for Early Spring and Fall

Low production of pastures has long been a problem in South Dakota. Many of these pastures of bluegrass or native short grasses, while palatable and highly nutritious, do not produce enough TDN (total digestible nutrients) an acre. In other cases more productive grasses are suppressed by grazing before the grasses have sufficient spring growth. Adequate spring growth is required for the grasses to remain productive.

The use of early emerging species of grass for early spring pasture will allow the grasses in the main pasture to get started and be more productive. Early spring pastures are needed by livestock producers who start grazing before mid-May. Young stock can be moved out of the muddy barnyard. Cows can calve on clean grass sod when the producer is occupied with other spring work.

This Fact Sheet discusses grasses that are most productive in early spring and fall. Grasses that provide good grazing during other seasons are discussed in three other publications: "Cool-Season Grasses for May and June," "Warm-Season Grasses for July and August," and "Grasses for Special Purposes."

Crested wheatgrass and Russian wildrye are early-emerging, cool-season grasses adapted to the western two-thirds of South Dakota. Kentucky bluegrass pastures, too rocky or rolling to seed to new species, are best used during May and early June. They can be grazed continuously for about a month. Many bluegrass pastures can be improved by weed control, fertilization, and interseeding portions of the pasture with early-growing, cool-season grasses and legumes.

The same kind of pastures used in early spring can be used for pasture during September and October. Crested wheatgrass greens-up in September and provides late-fall grazing if fall rain is ample. Russian wildrye is less dependent on fall rain and produces green forage for 2 weeks longer.

To produce maximum forage yields, pastures need a "rest period" during

the growing season to replenish root reserves. Therefore, pastures grazed late in the fall are not very useful for grazing early the next spring. Fall application of nitrogen fertilizers helps give early spring growth, but does not entirely offset the delay caused by late fall grazing.

Crested Wheatgrass

Crested wheatgrass, *Agropyron desertorum* (Fisch.) Schult., is an introduced cool-season perennial bunchgrass with fibrous root system. Stems are fine and develop dense tufts 2 to 3 feet high. Leaves are about 1/4 inch wide, 6 to 10 inches long, flat, somewhat lax and slightly hairy on the upper surface. The dense spikes are 2 to 3 inches long; the spikelets are closely crowded and tend to form comblike crescents.

Crested wheatgrass is recommended for use as a hay crop or for pasture during early spring or late fall. Mix with alfalfa when used as a hay crop or early spring pasture.

Crested wheatgrass is early emerging (April), highly palatable (short season), medium yielding (1 1/2 to 2 tons an acre), highly nutritious, drought resistant and long-lived (40 to 50 years). A pasture of crested wheatgrass lengthens the grazing season by 2 to 4 weeks in the spring. It is ready to graze 2 to 3 weeks before most tame grasses and cool-season native grasses. Crested wheatgrass also produces good fall pasture if moisture conditions are favorable, and extends the grazing season into October. However, late fall grazing reduces root reserves so that



Seeds (X5 1/4) and seed-heads (X2/3) of wheat-grasses. A—standard crested; B—Siberian; C—fairway crested.

by Lyle A. Derscheid, agronomist, Cooperative Extension Service; James G. Ross, professor, and C. R. Krueger, head, Plant Science Department, Agricultural Experiment Station; and C. M. Schumacher, range conservationist, Soil Conservation Service.

spring growth is delayed. Therefore, a pasture grazed late in the fall seldom produces good pasture early in the spring. Crested wheatgrass will produce satisfactory hay when cut in the late boot stage. Its bunchy-type of growth makes it less effective than sod-forming grasses for erosion control, especially on steep slopes.

Crested wheatgrass is not as productive in eastern counties as some other species. Where a late-spring and summer pasture of tame grasses can be grazed by mid-May, it may be more profitable to keep the livestock in drylot for an additional 2 to 3 weeks than to use land for a relatively low-yielding species of grass. Fewer acres may be required to raise forage fed in drylot than would be needed for a crested wheatgrass pasture.

The economic status of crested wheatgrass may be improved in at

least two ways. It is possible to harvest a crop of seed after the livestock have been shifted from crested wheatgrass to other pastures, or an alfalfa hay crop may be harvested from a crested wheatgrass-alfalfa pasture after the livestock have been moved to other pastures. Either procedure makes it possible to get increased production from the early spring pasture.

Although crested wheatgrass is not as productive as smooth brome grass or intermediate wheatgrass in eastern South Dakota, yields of the three grasses have been about equal at central and western locations. Since it is less productive in areas of higher rainfall, it requires less nitrogen than other grasses. It will produce its average yield for many years without much care, while slender wheatgrass, for example, tends to die out after 2 or 3 years and smooth brome and interme-

diate tend to become sod-bound if not fertilized properly. Fields of crested wheatgrass planted in 1915 at Mandan, N. D., still in existence, produced an average of 1,675 pounds per acre for the first 30 years.

Crested wheatgrass can grow at low temperatures. As a result, it makes earlier and more rapid growth than many other grasses. It is drought-resistant and has survived the most severe periods of dry weather. This characteristic is probably caused by its extensive (8 to 10 feet deep) root system, which permits storage of abundant food reserves and ready utilization of water. The grass becomes somewhat dormant during dry, hot periods, thus being protected from drought injury. With a favorable moisture supply, growth is resumed during the cool days of fall and continues until late in the season.

Crested wheatgrass does well on productive soils of almost any texture, ranging from light sandy loam to heavy clay. It is better adapted to droughty sites than most other tame grasses. It is moderately tolerant to alkali, but will not persist under prolonged flooding.

In South Dakota, crested wheatgrass is well adapted to most of the area west of the Missouri River and is fairly well adapted in the area between the James and Missouri Rivers.

Two distinct types of crested wheatgrass grown commercially are standard, *Agropyron desertorum* (Fisch.) Schult., and fairway, *Agropyron cristatum* (L.) Gaertn. Standard is generally planted in the United States. It is highly cross-pollinated and has a wide range of variability with respect to head type, leafiness, and coarseness of stems. Standard is taller, more upright, and has a more extended head.

Fairway has smaller seeds, shorter, broader heads, smaller seedlings, and shorter plants with many basal leaves. Fairway has been used to some extent as a dryland lawn grass (primarily on golf fairways), but it has a tendency to become bunchy as stands grow older. Fairway has less summer dormancy, remains green longer than standard and has more leaves per stem.

Although yield of dry matter may be somewhat less for fairway than for good standard types, the yield of TDN per acre for the two is about equal. There is some indication that fairway may be less apt to cause bad flavor in



Siberian wheatgrass. Plant X2/3; ligule X8 1/2.

milk. Fairway was developed in Canada and is used for more general purposes than standard.

Nordan is the variety of standard wheatgrass recommended for use in South Dakota. When fertilized, it averaged 2.3 tons per acre at Brookings, 1.6 at Watertown, 1.56 at Eureka, 1.6 at Norbeck, 1.7 at Highmore, 1.3 at Presho, and 0.92 tons per acre at Cottonwood.

Siberian Wheatgrass

Siberian wheatgrass, *Agropyron sibiricum* (Willd.) Beauv., is an introduced, drought-resistant perennial bunchgrass with a fibrous root system and jointed stems. It is similar to crest-

ed wheatgrass, but has narrower, awnless heads. In South Dakota, it has not yielded as well as crested wheatgrass.

Siberian wheatgrass is closely related to crested wheatgrass. At Brookings when Nordan crested wheatgrass and P-27 Siberian wheatgrass were compared, it was determined that crested had higher digestibility (60.9% to 56.5%). Nordan stems were markedly more digestible than P-27 in the last two-thirds of the season. Lignin content was about equal at heading (4.7% and 4.5%) and crested was slightly lower 2 weeks later—6.1% to 6.8%.

In appearance, Siberian wheatgrass differs from crested wheatgrass. Stems are finer, leaves are more lax, seed heads are narrower, and glumes are awnless.

Siberian wheatgrass produces 15% more seed per acre than crested wheatgrass on irrigated land. On non-irrigated soils like those of eastern South Dakota, the 4-year average yield is 560 pounds per acre. The average on soils like those of western South Dakota is 448 pounds, while that for Nordan crested wheatgrass is 406 pounds.

Russian Wildrye

Russian wildrye, *Elymus junceus* Fisch., is an introduced, cool-season perennial bunchgrass with a deep fibrous root system. Seedbearing stems are 2 to 3 feet high, basal leaves are about $\frac{1}{4}$ inch wide and 10 to 15 inches long. Seedheads are spikes 4 to 6 inches long.

Russian wildrye is recommended for use as pasture during early spring or late fall, as is crested wheatgrass. However, it affords more grazing during the summer. In areas of adaptation, it is strongly competitive and will "crowd out" other species mixed with it. Crested wheatgrass may be seeded with it in areas where Russian wildrye is less well-adapted.

This grass emerges early in the spring, remains green during much of the summer and retains a high percentage of quality protein until late in the fall. It provides green forage about 2 weeks later in the season than any other introduced grass. It is palatable (long season), nutritious, high-yielding (for pasture) and drought resistant.

Livestock gains on Russian wildrye are equal to those obtained on crested wheatgrass during early spring, but better than crested when grazed during June and July. Russian wildrye appears to be less palatable than other grasses early in the spring, but equally palatable during the remainder of the season.

As with crested wheatgrass, its main use is supplemental pasture. In some locations, it grows earlier and provides forage sooner than crested wheatgrass. Although Russian wildrye grows best during the cool season, its period of summer growth is longer than most cool-season grasses. It starts growth about the same time as crested wheatgrass and matures seed some 3 weeks earlier (about July 1). With favorable conditions, growth will continue after seed maturity and provide summer pasture. It is also useful as a late summer and fall pasture because of its quick regrowth. Late fall grazing will

Russian wildrye. Plant and seedhead X2/5; ligule X8 1/2; seed X3 1/2.



reduce root reserves and delay spring growth the next year; therefore, pastures grazed late in the fall seldom make good early spring pastures. It is a strong competitor with weeds or grasses and legumes used in mixed plantings.

Russian wildrye is adapted to a fairly wide range of soils. However, because of its bunch-type growth habit it is not well suited to slopes where erosion may occur. A dense stand is needed to prevent soil erosion between plants. It is most productive on fertile loams. Old stands require nitrogen fertilization if high yields are to be maintained. Forage containing 22%

protein has been obtained after high nitrogen application on irrigated land at Redfield.

Growth characteristics are similar to those of orchardgrass, Kentucky bluegrass, and other non-jointed grasses and adapt it to continuous grazing management. Unlike grasses with jointed stems, only 5% to 10% of the stems bear seed heads. Forage production comes from continued leaf growth at the junction of the leaf blade and sheath. Continued removal of leaves by grazing or mowing stimulates rapid regrowth of leaves and maximum forage production. Deferred grazing permits the sheath to grow too high thereby raising the collar (junction of leaf blade and sheath) to a vulnerable position.

Removal of the collar results in dormancy because the source for regrowth is gone. Continuous, moderate grazing started early, keeps the collar low; regrowth is rapid; and maximum forage production is obtained.

Though many of its growth characteristics are similar to orchardgrass, its season of growth and bunch-type growth habit are similar to crested wheatgrass. It has poor seedling vigor and is inferior to most tame grasses in this respect.

Since most forage is produced as basal leaves, it is not a high-yielding hay crop. This grass only produced about 1 ton of forage per acre at Highmore, 1 ton at Norbeck, 0.9 ton at Presho, and 0.50 ton at Cottonwood. It is better used as pasture. Like orchardgrass, it makes rapid recovery after top growth is removed, and best management is moderate, continuous grazing.

Vinall is the variety recommended for use in South Dakota.

Canada Wildrye

Canada wildrye, *Elymus canadensis* L., is short-lived, cool-season, native bunchgrass. Because of its name, it is sometimes confused with Russian wildrye. This is why it is included here. However, the name is where the similarity stops.

Canada wildrye is common in eastern South Dakota and on moist areas in western counties. It produces a good yield for 1 to 3 years, but under grazing trials, gains from this grass have been disappointing.

THE BLUEGRASSES

Approximately 200 species of Poa are distributed throughout the world, primarily in the temperate and cooler regions.

The bluegrasses are valued primarily for pasturage, hay, and for lawns. They rank as the most palatable of range and pasture grasses and are suited for many special agricultural uses. The most important are Kentucky bluegrass and Canada bluegrass.

Kentucky Bluegrass

Kentucky bluegrass, *Poa pratensis* L., sometimes called Junegrass, is an introduced, sod-forming, cool-season perennial grass that spreads by means of rhizomes. Stems arise from crowding tufts of leaves. Stems are $\frac{1}{8}$ inch wide and 1 to 2 feet high. Leaves are flat or folded and up to $\frac{1}{2}$ inch wide. Seedheads are panicles. It is adapted

Canada wildrye. Plant X $\frac{1}{2}$; seed and seedhead X5.



to much of South Dakota and withstands intense grazing; therefore, it is a chief component of overgrazed pastures in eastern counties. It is palatable and produces good early pasture, but it does not yield well.

It has growth characteristics similar to orchardgrass and starts growth early in the spring. Therefore, it can best be used as supplementary pasture in the spring. It should be grazed continuously during May and early June.

Canada Bluegrass

Canada bluegrass, *Poa compressa*,

resembles Kentucky bluegrass, but differs in its blue-green foliage, distinctly flat culms and short and much contracted panicles. It also is rhizomatous and spreads by these underground rootstalks. It is extensively naturalized in this country. It is adapted to open, rather poor, dry soils and in such situations, competes with Kentucky bluegrass as a pasture grass. For lawns and golf courses and similar purposes, it can be used to advantage under conditions too dry or otherwise not entirely favorable to Kentucky bluegrass.

Junegrass

Junegrass, *Koeleria cristata* L., is a cool-season, native, bunchgrass. It emerges early in the spring and produces most of its forage in basal leaves. Stems are 1 to 2 feet high, leafy at the base, leaf blades are flat, seedhead is cylindrical and 1½ to 6 inches long. It produces low yields of nutritious, palatable forage and matures in early June. It is best used for spring grazing. Junegrass is included in this publication mainly because many people erroneously use this name for Kentucky bluegrass.

Kentucky bluegrass. Plant X1/2; seed-head X5; seed X10.



ACKNOWLEDGMENT

The authors have drawn freely from the USDA Yearbook, "Grasses" and the SCS Agriculture Handbook, No. 339 "Grasses and Legumes for Soil Conservation in the Pacific Northwest and Great Basin States." The line drawings were taken from SCS Agriculture Handbook 339, and SCS-TP-151 "Key to Perennial Grasses." All production data, however, were obtained in South Dakota unless otherwise specified.

Junegrass. Plant X1/2; seed X10.



Fact Sheets for Additional Information

Cool-Season Grasses for May and June
Warm-Season Grasses for July and August
Grasses for Special Purposes
Grazing Management Based on How Grasses Grow
Summer Pasture and Forage Systems
Interseeding for Pasture and Range Improvement
Fertilizing Pasture and Hayland
Alfalfa Management
Alfalfa Varieties for South Dakota
Chemical Weed Control in Pasture, Range, and Hayland

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File: 1.4-8-4M-1-72-2M-2-75-3652

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FS 546
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